09/720746

WO 00/00078 1/PRTS PCT/NL99/00399

528 Rec'd PCT/PTO 29 DEC 2000

PROCESSING OF DATA FROM REACTIONS OF RESPONDENTS TO VISUAL STIMULI

The invention relates to a method for processing and manipulating data and measurement data obtained by and further to the confrontation of respondents with visual stimuli, wherein:

a1) predetermined physiological activities and reactions of respondents are measured and recorded with the aid of equipment known per se,

a2) and/or the response of respondents to questions posed, relating to the stimuli presented, are recorded.

Prior art

Methods for determining performance aspects of stimuli on the basis of measurement data from confrontations of respondents with stimuli are widely known from the marketing and market research sectors. The aim of the known methods is, for example, to make statements with regard to aspects of stimuli by determining how a number of respondents react, for example, to advertising images and slogans, film clips, images of people, logos and other stimuli presented to them. The many users of the known methods adopt numerous variants with regard to the type of measurement data which are processed, the quantity, the method of processing, the types of results which are obtained and with regard to the way in which these results are presented.

The consequence of this is frequently that the significance of the results obtained in accordance with known methods is difficult to determine, that the results are difficult and virtually impossible to interpret, complex, leave room for individual and different interpretations, relate to different aspects of stimuli, are not validly comparable with one another and, partly because of this, in many cases cannot lead to accurate determination and evaluation of the performance of stimuli.

First aim of the invention

A first aim of the invention is, therefore, to provide a different method for processing stimuli data, random sample data and measurement data resulting from confrontation of respondents with stimuli, by means of which said data can be processed in a

standardised manner to produce simple, standardised interrelatable results, part results and detailed results which can be interpreted by anyone, relating to the most significant performance aspects of stimuli, such as commercial stimuli, including advertisements, specifically the ability to attract the attention of people, retain attention and establish contacts with consumers, as well as relating to the quality thereof.

Further prior art

The collection and processing of data in accordance with the known methods is still usually carried out verbally, manually or with only a low degree of automation, the various aspects usually being on the basis of "question and answer" and "keeping a tally" of results.

The direct consequences of this are usually, inter alia, relatively long throughput times and relatively high costs. After all, if an interviewer is able to conduct and process 10 interviews per day he or she takes 10 days to carry out research, relating to one or just a few advertisements, on a random sample where n = 100 (100 test persons).

Consequently, 100 interviewers would have to be employed to conduct research on, for example, 100 advertisements, with n = 100 and in a period of 10 days, whilst in order to obtain the same measurement data and results within one day even the unimaginable and prohibitively expensive number of 1,000 interviewers is needed.

Instead of human interviewers it is also possible to make use of equipment with which predetermined physiological activities and reactions of respondents can be measured and recorded. Merely by way of example, consideration can be given to known equipment for measuring eye movements and/or movements of the head.

In addition, both when making use of human interviewers and when using equipment, there is a risk of inaccuracies, for example as a consequence of human error, and, consequently, of a degree of inaccuracy in the results which cannot be estimated.

The indirect consequences, such as those for companies which base some of their decisions, for example marketing decisions, on these results which are partly incorrect, inter alia as a result of the said inaccuracy and human errors, are much more difficult to compile, but can be very severe, for example because they can have an influence on the sales and the market share of the companies concerned and other companies.

Further aim of the invention

A further aim of the invention is, therefore, to provide a different method which can be automated, with which massive quantities of measurement data can be processed by systems to produce results within a short time, without manual tasks, or even the possibility of human intervention.

Brief description of the invention

The abovementioned aims are achieved with a method of the type described in the first paragraph, in that

b1) first of all those elements of each stimulus which are of importance in connection with the abovementioned aim are determined,

b2) in that the data recorded in step a1) are then processed automatically by comparison with the geometry and positions of all stimulus elements, such that it is established, per respondent and per stimulus, on which of the relevant elements thereof the respondents have fixed their gaze,

b3) in that the data recorded in step a2) are processed automatically in such a way that opinions with regard to one or more elements of the stimulus are determined per respondent and per stimulus,

b4) in that it is then determined individually for all relevant elements of all stimuli how many respondents have fixed their gaze on which relevant elements and, respectively, how many respondents have formed what opinions on these.

When the method according to the invention is used in this way, interviewers are superfluous and operators and/or third parties in principle have no opportunity to influence the results calculated on the basis of the measurement data.

Respondents can be confronted with stimuli in a wide variety of ways, for example by allowing respondents to leaf through a book or periodical, by presenting images on a screen, and the like. Any method is possible, assuming that it remains possible to use the said equipment for determining and recording specific physiological responses and activities.

In particular, but certainly not exclusively, the said equipment can, for example, determine and record the positions in a plane on which respondents fix their gaze. By

projecting these positions on a relevant stimulus the said comparison can then be carried out in step b2).

During processing of the signals attention is paid in particular to those locations within a stimulus on which the centre of the eye has been focused for a longer or shorter period. There is said to be a fixed gaze if the centre of the eye has been focused at least for a predetermined minimum period of time on an area of predetermined dimensions. The duration of individual fixed gazes can be measured and expressed in time units which relate to a fraction of a second, such as the unit: 1/50 sec. The duration of a fixed gaze can thus relate to a few of these units up to a large number of these units. In connection with the duration of fixed gazes and/or the pattern within these, a distinction can be made between ways in which the gaze is fixed.

The method is such that it is possible from the organisational standpoint to process the measurements of the responses of, for example, more than a hundred respondents per day to, for example, a few hundred stimuli in at most a few hours to produce simple results.

In its most elementary form, the database that is obtained with the method according to the invention on the one hand contains a definition of all relevant elements of all stimuli and also contains, per element and per respondent, data relating to whether or not the gaze has been fixed, the way in which the gaze has been fixed, the time for which and the points in time at which the gaze has been fixed.

The value of the database as a source of marketing information increases if data on the respondents are also stored.

It is therefore preferable that a number of personal data are recorded for each respondent, which data can be related to the findings from step b4).

The value of the database as a source of marketing information also increases if yet further data on the stimuli are stored.

It is therefore preferable that a number of stimulus-related data are recorded for all stimuli, which data can be related to the findings from step b4).

As well as determining on which of the relevant elements the respondents have fixed their gaze, it is usually also important to know, per respondent and per stimulus, the time for which the gaze has been fixed on said elements.

It is therefore also preferable that step c1) is broken down into two sub-steps:

c1.1) in which it is determined in the abovementioned manner, per relevant element or

per specific group of relevant elements, how many respondents and which respondents have fixed their gaze thereon,

c1.2) in which it is determined, per relevant element or per specific group of relevant elements, for what period how many respondents and which respondents have fixed their gaze thereon.

Furthermore, it is usually also important to know, per respondent and per stimulus, at what points in time and on what elements the gaze has been fixed.

It is therefore furthermore preferable that step c1) is broken down into two substeps:

c1.1) in which it is determined in the abovementioned manner, per relevant element or per specific group of relevant elements, how many respondents and which respondents have fixed their gaze thereon,

c1.3) in which it is determined, per relevant element or per specific group of relevant elements, at what points in time how many respondents and which respondents have fixed their gaze thereon.

Furthermore, it is usually also of importance to know, per respondent and per stimulus, the way in which the gaze has been fixed.

It is therefore furthermore preferable that step c1) is broken down into two substeps:

c1.1) in which it is determined in the abovementioned manner, per relevant element or per specific group of relevant elements, how many respondents and which respondents have fixed their gaze thereon,

c1.4) in which is determined, per relevant element or per specific group of relevant elements, the way in which how many respondents and which respondents have fixed their gaze thereon.

Detailed explanation of the invention

A few important types of physiological measurement data, resulting from confrontation of respondents with visual stimuli, which can be processed using the method relate, for example, to eye activity, including movements of the eyes, positions, states, eye positions in the eye sockets, directions of view, pupil sizes, blinking frequencies, positions and movements of the head, eye-stimulus distance, and also changes in these over time,

etc. By coupling to stimuli data, for example by means of a time axis, such measurement data contain information on which stimuli, and which elements thereof, are visible to respondents at what point in time, for how long and to what degree, which elements thereof are actually within the visual range of respondents and, in particular, on which stimuli elements the centres of the eyes of respondents are fixed.

A number of methods, systems and commercially available instruments are known and usable for generating the abovementioned measurement data, centrally or in several places or locations located some distance apart.

For example, when advertising is used in marketing activities the effectiveness thereof is all important. In this context it is extremely important to find out whether an advertising message is capable of attracting the attention of people, of retaining the attention, of establishing contacts with people, to what degree these aspects are achieved and what the quality thereof is.

Bill Bernbach once wrote: "Advertising is the art of moving an idea from one person's head into the head of another".

In a more general sense it can be important to find out what the reading pattern is when, for example, flicking through publications, newspapers or other printed material. Which pages are opened? How long do people spend looking left, right, bottom and top? But it is also important to find out how, for example, the handling of packaging, etc. progresses while looking at it.

With the method according to the invention it is possible for the first time for results with regard to the performance of stimuli, such as the degree to which an advertisement is capable of attracting the attention of consumers and, subsequently, of establishing contacts with consumers, to be determined and rendered reportable and mutually comparable, in highly condensed form, as a result of which interested parties are able to gain insights and arrive at evaluations.

It is also possible for the first time to present accurate results relating to qualitative information, resulting from measurements made on a quantitative scale (large scale).

The ability, using the method according to the invention, to process measurement data on, for example, physiological responses from confrontations with large numbers of stimuli for large numbers of respondents, to produce simple, standardised results, for example per stimulus, per selection of stimuli, for a random sample or for a selection of random samples, for example presented in the form of measurement reports providing

insight, and to have these results available to interested parties within a few hours, but also the ability to make the raw data available together with the processing software in order to produce and present measurement reports in accordance with user requirements and insights, are in themselves already innovative and break new ground compared with all existing methods.

The visual stimuli relate, for example, to printed material, products, illustrations, photographs, texts, instructions, instructions for use, etc., in the form of 'pre-test' or 'pre-press' or in printed media, including periodicals, newspapers, trade journals, brochures, flyers, house-to-house printed matter, DM, books, guides, etc. However, these stimuli also relate to stimuli such as, for example, TV stimuli, productions, spots and/or packaging, retail formulae, shape, design, art, designs, equipment, models (for example of cars), real and photographic product concepts as well as presentation by, for example, projection on screens, including TV screens.

Parties interested in the results and in the measurement reports are, for example, advertisers, marketing executives, design, film and TV production, product development, media operators, etc.

The simple and standardised results of the method according to the invention play a decisive role in the ability to produce information, the ability to obtain knowledge and also the ability to develop insights with regard to the abovementioned matters. It is the results according to the method which for the first time place advertisers and advertising designers, amongst others, in a position to, for example, be able to establish shortcomings of stimuli, be able to expose the causes thereof and then be able to rectify the shortcomings.

With the method according to the invention, processing of the physiological measurement data to produce results can be made dependent on data, such as random sample data, including, for example, sex, age, other demographic data, social data, preferences and interests, but also on the ability of respondents to take in information, tempo, reading ability and interest in product categories; but also on stimuli data, including, for example, the media in which advertisements have been placed, publication data, page numbers, dimensions and use of colour, and also the positions on advertisements where the advertising elements, such as the brand, the products, the copy, the headlines, etc., are located, for example indicated by means of boxes, polygons, contours and/or other shapes, and, furthermore, all other conceivable characteristics of respondents and

data relating to stimuli, as well as combinations thereof.

Description of the figure

The method is further explained with reference to Figure 1. Figure 1 shows in abbreviated form one example of the method on the basis of six stages.

Example of use of the invention

Stage 1 shows the 'raw data'. As an example, these are, inter alia, measurement data relating to the fixed gaze of respondents in response to stimuli and stimuli elements. The volume of these raw data comprises, for example, the measurements from a few hundred stimuli and more than a hundred respondents.

In stage 2 the raw data are ranked according to quantities of data on fixed gazes which, for example, always relate to one individual stimulus, such as all positions on one advertisement on which the gaze is fixed, for all respondents.

In stage 3 the data is further ranked per stimulus, for example in respect of the extent to which respondents have fixed their gaze on three main advertisement elements taken individually: the brand, the pictorial and the copy.

In stage 4 the numerical number of times the gaze has been fixed on the main advertisement elements is determined per stimulus. The (part) results in this stage also relate, inter alia, to the time spent by respondents per stimulus and per stimulus element, the points in time at which the gaze is fixed and the way in which the gaze is fixed.

In stage 5 links are established per stimulus using concepts such as "attracting the attention of people" and "establishing contacts with people". In this phase a breakdown is made according to the combinations of main advertisement elements on which test persons have fixed their gaze:

- X% of the test persons have fixed their gaze on the brand only. That is to say these persons have fixed their gaze on the brand but not on the pictorial or on the copy.

The advertisement has established contact at Level 1 with X% of the test persons. This is the lowest level at which an advertisement can establish contacts with consumers.

- Y% of the test persons have fixed their gaze on the brand and the pictorial, or the brand and the copy.

The advertisement has established contact at Level 2 with Y% of the test persons. -

Z% of the test persons have fixed their gaze on all three main advertisement elements: the brand, the pictorial and the copy.

The advertisement has established contact at Level 3 with Z% of the test persons. This is the highest level at which an advertisement can establish contacts with consumers.

In stage 6, by way of example, a highly condensed result is calculated: the degree to which a stimulus succeeds in attracting the attention of persons, expressed as a single percentage. This percentage is the sum of X%, Y% and Z%.

The result from stage 6 is an overall result: such as the advertisement attention score, AtScore, or such as the advertisement retention score, RetentionScore.

By way of example, it is now indicated, point by point, which aspects, amongst others, can be determined and displayed in a standardised manner starting from the raw data (input) using the method according to the invention. The aspects indicated here by way of example relate to elements of typical printed matter research.

1. A diagnosis of the random sample used in the confrontation with stimuli, for example partly based on the random sample data, the make-up of the random sample in respect of:
   - sex,
   - age,
   - education,
   - the demographic variables,
   - the social variables,
   - interests and areas of interest,
   - preferences, for example with regard to brands and products,
   - what are the publications read,
   - habits, for example smoking and drinking,
   - visual, auditive and psychic abilities,
     - the ability to take in information,
     - the reading ability,
     - the ability to understand,
   - the tempo, etc.

2. A diagnosis of, for example, printed media, for example partly based on the stimuli data, broken down into:

- numbers and types of publications,
- the pages that were opened by respondents,
- the degree to which pages were opened,
- the pages which respondents kept open for more than X seconds,
- the time for which pages were kept open,
- the number of pages on which respondents fixed their gaze more than X times,
- the distribution of the locations on pages on which the gaze was fixed,
- the number of times the gaze was fixed, per page, per quarter page, or s smaller.
- the time spent on an entire publication, per page, per quarter page, or smaller, etc.

The abovementioned diagnoses broken down separately for:

- advertisement pages, advertisements or advertisement elements,
- editorial pages
- left-hand pages
- right-hand pages
- front and back pages, etc.

3. The aspects of stimuli such as, for example:

Descriptive stimuli aspects:

- placing in medium: date, issue, page number, position,
- subject, theme,
- size,
- style, use of colour, etc.

Stimuli performance aspects:

- the degree to which respondents fix their gaze on all elements of advertisements considered to be important by advertisers.
- the degree to which respondents fix their gaze on one, two or three of the three main advertisement elements.
- the degree to which stimuli are capable of attracting the attention of people:
  - attention level 1:
    gaze fixed only on the brand.
  - attention level 2:

gaze fixed on the brand and the pictorial, or on the brand and the copy.

- attention level 3:

gaze fixed on the brand and the pictorial and the copy.

- general:

gaze fixed on specific elements without which the message cannot be taken in.

- the degree to which stimuli are capable of retaining the attention of people.

All results obtained in accordance with the method can be related to similar results for:

- other stimuli,
- the same stimulus in other media,
- the same stimulus at other times,
- etc.

All results obtained in accordance with the method can also be related to averages of similar results for:

- the brand concerned,
- other brands,
- categories,
- media,
- campaigns,
- time periods,
- etc.

4. The circumstances during the measurement, such as:

- date and time of day,
- the point in time at which the measurement was made, for example differentiation of morning, afternoon and evening results.
- the total number of respondents,
- the total number of publications; periodicals and/or newspapers,
- the total number of pages,
- the total number of advertisements,
- the news situation (including current affairs and sport), etc.,
- the socio-economic situation,

- the temperature (indoor and outdoor),
- the degree of atmospheric humidity and atmospheric pressure, etc.

5. Any conceivable combination of 1, 2, 3 and 4.

6. All other aspects considered worthwhile, for example by posing questions on these, such as by means of a multiple choice questionnaire.

It will be clear that it is not possible to deal with all aspects and that in the above the method according to the invention has been explained only on the basis of a few specific examples and that numerous modifications and/or additions can be made without going beyond the scope of the inventive concept.